Intel Atom® Processor E3800 Product Family Board Support Package for Windows* 10 IoT Core 32-Bit and 64-Bit Platforms

Release Notes

January 2018

Revision 002

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Revision History

Revision Number	Description	Revision Date
002	Intel Atom® Processor Product Family Board Support Package for Windows* 10 IoT Core 32-bit and 64-bit Platforms—MR1 Release	January 2018
001	Intel Atom® Processor Product Family Board Support Package for Windows* 10 IoT Core 32-bit and 64-bit Platforms—Gold Release	December 2015

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1.0 Introduction

1.1 Scope of Document

This Release Notes document is for the Board Support Package (BSP) for the Microsoft* Windows* 10 IoT Core 32-bit and 64-bit operating systems. This document includes information about the IoT Core Inbox drivers for Windows 10 that have been validated using the Intel Atom® E3800 system on a chip (SoC) family platforms. The driver interfaces, limitations, and known issues are also covered.

1.2 Intended Audience

This document is intended for OEMs and ODMs who are enabling IoT Core (formerly known as Athens) drivers with the Intel Atom® E3800 processor, Intel Celeron® processor N2XXX, and Intel Celeron® processor J1XXX.

1.3 System Requirements

The operating system supported is the Microsoft Windows 10 IoT Core 32-bit and 64-bit operating system.

1.4 Acronyms and Terminology

Table 1. Terminology

Term	Description
API	Application Programming Interface
ATAPI	ATA Packet Interface
BSP	Board Support Package
CRB	Customer Reference Board
DMA	Direct Memory Access
GPIO	General Purpose Input/Output
HSUART	High Speed Universal Asynchronous Receiver/Transmitter
I/O	Input/Output
I2C*	Inter-Integrated Circuit*
IOCTL	Input/Output Control
MSDN*	Microsoft* Developer Network

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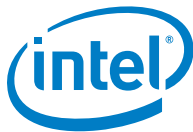
Term	Description
OS	Operating System
PIO Mode	Programmed I/O Mode
SATA	Serial ATA
SPI	Serial Peripheral Interface
USB	Universal Serial Bus

1.5 Reference Documents and Resources

Table 2. Reference Documents and Resources

Document	Document No./Resource Location
Microsoft* General-Purpose I/O Controller Driver (GPIO)	https://msdn.microsoft.com/en-us/library/windows/hardware/hh439456(v=vs.85).aspx
Microsoft* Simple Peripheral Bus (SPB) Driver (I2C and SPI)	https://msdn.microsoft.com/en-us/library/windows/hardware/hh450906(v=vs.85).aspx
Microsoft* Serial Communications in Win32 (HSUART)	http://msdn.microsoft.com/en-us/library/ms810467.aspx
BSP for Microsoft Windows* 10 IoT Core 32-bit on Intel Atom® Processor E3800 Product Family User Guide*	333573-001US
Intel Atom® Processor E3800 Product Family Datasheet	538136
Intel Atom® Processor E3800 Product Family User Guide	333574
Bay Trail-I BIOS Writer's Guide Addendum	526998

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2.0 Release Summary

2.1 Release Details

- New: Board Support Package v5.3.4.0808
- Released December 2017

2.2 Release Contents

The contents of this release include:

- Intel Atom®/Celeron®/Pentium® Processor Windows* 10 IoT Core 32-bit BSP
- Intel Atom®/Celeron®/Pentium® Processor Windows* 10 IoT Core 64-bit BSP
- Windows* OS 10 IoT Core BSP Release Notes
- Windows* OS 10 IoT Core BSP User Guide
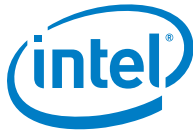- Intel Software License Agreement

The BSP Installer package includes the following files:

- Driver files for:
    - Intel Atom®/Celeron®/Pentium® Processor UART Host Controller
    - Intel Atom®/Celeron®/Pentium® Processor I2C Controller
    - Intel Atom®/Celeron®/Pentium® Processor SPI Controller
    - Intel Atom®/Celeron®/Pentium® Processor GPIO Controller
    - Intel Atom®/Celeron®/Pentium® Processor HD Graphics

- BSP XML file (located in OEM Input Samples):
    - RetailOEMInput.xml
    - TestOEMInput.xml

2.3 The Ready Features for Serial I/O

Table 3. Ready Features for Serial I/O

Area	Feature	Source	Ready[1]
USB	General USB 2.0 feature	Windows* 10 IoT Core Inbox driver	Yes
	General USB 3.0 feature	Windows 10 IoT Core Inbox driver	Yes
	USB 2.0 Boot	Windows 10 IoT Core Inbox driver	Yes

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Area	Feature	Source	Ready[1]
SATA	General SATA feature	Windows 10 IoT Core Inbox driver	Yes
PCIe*	General PCIe feature	Windows 10 IoT Core Inbox driver	Yes
Intel® High Definition Audio	General HD Audio feature	Windows 10 IoT Core Inbox driver	Yes
	Intel® Display Audio	Intel	Yes
Power Management	Power Mgmt S0 and S5	N/A	Yes
	Power Mgmt Sleep S3	Intel	Yes
	Power Mgmt Hibernate S4	Intel	Yes
GPIO Driver[1]	Direction Setting	Intel	Yes
	Multiplexing Setting		Yes
	Level Value Setting		Yes
	Pin Setting Query		Yes
I2C* Driver[1]	Standard Mode (100 Kbps)	Intel	Yes
	Fast Mode (400 Kbps)		Yes
SPI Driver[1]	SPI Mode 0, 1, 2, 3	Intel	Yes
	Transfer rate from 100 Kbps up to 15 Mbps		Yes
HSUART Driver[1]	Baud rate support up to 4000000	Intel	Yes
	Data size 5, 6, 7, 8-bit		Yes
	Odd, even, none parity	Intel	Yes
	1, 1.5, and 2 stop bits		Yes
	Hardware and None flow control		Yes
DMA Feature[1] (I2C*, SPI, and HSUART)	DMA support for I2C, SPI, and HSUART	Windows 10 IoT Core Inbox driver	Yes

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Area	Feature	Source	Ready[1]
SD2	SD* and SDHC* cards	Windows 10 IoT Core Inbox driver	Yes
	Class 2, 4, 6, and 10		Yes
	1-bit and 4-bit bus mode		Yes
	FAT32, exFAT file system		Yes
	ADMA Transfer mode		Yes
	IoT Core OS Boot		Yes
eMMC*	Version 4.5 Storage	Windows 10 IoT Core Inbox driver	Yes
	IoT Core OS Boot		Yes

Note: Refer to the Feature Highlights and Limitations section for more information about the limitations of GPIO, I2C*, SPI, and HSUART features.

2.4 The Ready Feature for Graphics Driver

Features of this release include:

- Windows* OS 10 Internet of Things (IoT) Core support for Intel Atom® E3800 processor, Intel Celeron® processor N2XXX, and Intel Celeron® processor J1XXX

- 32-bit and 64-bit support on RS1 build 14393

- HW acceleration for D2D, D3D11, and video playbacks

- Driver support for the following displays (Single mode):
  - eDP* 1.3, DP* 1.1a, and HDMI* 1.14b
  - Wide range of display resolutions:
    - **Minimum resolution supported:** 640 x 480 @ 60 Hz
    - **Maximum resolution supported on eDP*:** 2560 x 1600 x 24 bpp @ 60 Hz
    - **Maximum resolution supported on DP* and HDMI:** 3840 x 2160 x 24 bpp @ 30 Hz and 2560 x 1600 x 24 bpp @ 60 Hz
  - Center and scaled modes
  - Rotation with all angles

- Driver support for Direct2D*—Direct2D

- Driver support for Direct3D*—D3D11.1

- Driver support for H.264, HEVC, VC1, and WMV9 media decode

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3.0 *What Is New in This Release*

The update release of I/O drivers that work for the Windows* 10 IoT Core operating system are as follows:

- SPI*

- GPIO

- I2C*

- HSUART

- HD Graphics

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4.0 *Feature Highlights and Limitations*

4.1 GPIO Driver

Review to the details about the GPIO driver on the *Microsoft* General-Purpose I/O Controller Driver (GPIO)* website (refer to Table 2).

The GPIO driver interface is exposed by a series of IOCTLs.

The Driver Binary Package consists of the following files:

- `iaiogpio.inf`
- `iaiogpio.sys`
- `iaiogpio.cat`

The enabled features support:

- GPIO multiplexing setting
- GPIO setting query—Queries multiplexing information on GPIO pins
- GPIO direction setting—Configures the selected GPIO pin as an input or output pin
- GPIO read pin—Reads the input pin's level value
- GPIO write pin—Configures an output pin's level as high or low
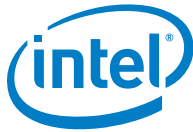- `GpioClx` DDI

Limitations: No known limitations.

4.2 I2C* Driver

Review the details about the I2C* driver (refer to Table 2).

The Intel Atom® E3800 processor, Intel Celeron® processor N2XXX, and Intel Celeron® processor J1XXX have seven I2C controllers, which share the same DMA engine. Hence, transferring large amounts of data can cause one I2C controller to occupy the DMA engine for a long duration.

By default, the I2C driver uses DMA to copy data between peripherals and system memory. However, the Windows* registry can be set to disable the DMA feature and copy data with the PIO mode. Refer to the "Software Driver BKMs" section in the *BSP for Microsoft* Windows* 10 IoT Core 32-bit on Intel Atom® Processor E3800 Product Family User Guide* (refer to Table 2), for more information about configuring the registry to control the DMA feature.

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The Driver Binary Package includes the following files:

- `iaioI2C.inf`
- `iaioI2C.sys`
- `iaioI2C.cat`

The enabled features support:

- 7-bit address Mode
- Standard Mode (100 Kbps)
- Fast Mode (400 Kbps)
- Polling of I/O data transfer

Limitation: The maximum single transfer size is limited to 64 KBs. Multiple transfers are required for data sizes more than 64 KB.

4.3 SPI Driver

Review the details about the SPI driver (refer to Table 2). The SPI driver interface is exposed by a series of IOCTLs.

The Driver Binary Package consists of the following files:

- `iaiospi.inf`
- `iaiospi.sys`
- `iaiospi.cat`

The enabled feature support:

- SPI Modes 0, 1, 2, 3
- Minimum transfer rate of 100 Kbps
- Maximum rate of 15 Mbps
- Polling of I/O data transfer (read/write)
- DMA data transfer

Limitations: No known limitations.

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4.4　　　HSUART Driver

The HSUART Driver interface is exposed by the standard Windows serial communication interface.

Review the details on serial communications in Microsoft* Win32 (refer to Table 2).

The Driver Binary Package consists of the following files:

- `iaiouart.inf`
- `iaiouart.sys`
- `iaiouart.cat`

For information about the Driver Interface Header, refer to the Microsoft* Serial Communications in Win32 (HSUART) website (refer to Table 2).

The enabled features support:

- Baud rates of 300—921600, up to 3686400 by default as specified in the Intel Atom® *Processor E3800 Product Family Datasheet*, Section 27.2.3 Baud Rate Generator (refer to Table 2). To set baud rates of 1M, 2M, 3M, and 4M, refer to the "Software Driver BKMs" section in the *BSP for Microsoft* Windows* 10 IoT Core 32-bit on Intel Atom® Processor E3800 Product Family User Guide* (refer to Table 2).

- Data sizes of 5, 6, 7, and 8-bit

- None, odd, and even parity

- 1, 1.5, and 2 stop bits

- "Hardware" and "None" flow control

- Serial Device Control Requests (IOCTLs) defined by Microsoft for serial controllers in Windows. Refer to the following limitations for IOCTLs.

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Limitations:

- When using 1.5 stop bits, the data size can only be supported up to 5-bits.

- The following IOCTLs are not supported in the driver:
  - `IOCTL_SERIAL_XOFF_COUNTER`
  - `IOCTL_SERIAL_LSRMST_INSERT`
  - `IOCTL_SERIAL_SET_BREAK_ON`
  - `IOCTL_SERIAL_SET_BREAK_OFF`

4.5 Errata, Closed Issues, and Known Issues

4.5.1 Errata

Table 4. Errata Descriptions and Recommendations

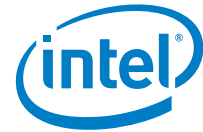| Issue #	Description	Impact	Recommendation
4995468	Windows* 10 Athens: Intel SSD 535 240 GB/480 GB not detected as storage drive.	Failed to detect Intel SSD as additional drive other than main/OS drive.	Disable DevSleep feature in BIOS. Refer to *Bay Trail-I BIOS Writer's Guide Addendum* (refer to Table 2).
4995469	Windows 10 Athens: Jerky sound happens on audio playback.	Jerky sound happens on audio playback for audio format MP3, WMA, and WAV on silicon Z8CE.	Will not fix. Use silicon other than Z8CE.

4.5.2 Closed Issues

Table 5. Closed Issues

Issue #	Description	Impact	Recommendation
N/A			

4.5.3 Known Issues

Table 6. Known Issues

Issue #	Description	Impact	Recommendation
N/A			

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5.0 Hardware and Software Compatibility

This release is compatible with the following hardware and software:

- Intel Atom® E3800 Product Family

- Intel Celeron® Processor N2807/N2930/J1900 Release

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